

FEDERAL AVIATION AGENCY

Washington 25, D. C.

TECHNICAL STANDARD ORDER

Regulations of the Administrator

Part 514

SUBJECT: LIFERAFTS (NONREVERSIBLE)

TSO-C70

Technical Standard Orders for Aircraft Materials,
Parts, Processes, and Appliances

Part 514 contains minimum performance standards and specifications of materials, parts, processes, and appliances used in aircraft and implements the provisions of sections 3.18, 4a.31, 4b.18, 6.18 and 7.18 of the Civil Air Regulations. The regulation uses the Technical Standard Order system which, in brief, provides for FAA-industry cooperation in the development of performance standards and specifications which are adopted by the Administrator as Technical Standard Orders, and a form of self-regulation by industry in demonstrating compliance with these orders.

Part 514 consists of two subparts. Subpart A contains the general requirements applicable to all Technical Standard Orders. These provisions are summarized below for the convenient reference of the public. Subpart B contains the technical standards and specifications to which a particular product must conform, and each Technical Standard Order is set forth in the appropriate section of Subpart B. The subject Technical Standard Order is printed below. ANY TECHNICAL STANDARD ORDER MAY BE OBTAINED BY SENDING A REQUEST TO FAA, WASHINGTON 25, D. C.

SUBPART A--GENERAL

This subpart provides, in part, that a manufacturer of an aircraft material, part, process, or appliance for which standards are established in Subpart B, prior to its distribution for use on a civil aircraft of the United States, shall furnish a written statement of conformance certifying that the material, part, process, or appliance meets the applicable performance standards established in this part. The statement of conformance must be signed by a person duly authorized by the manufacturer, and furnished to the Chief, Engineering and Manufacturing Division, Bureau of Flight Standards, Federal Aviation Agency, Washington 25, D. C.

Subpart A also requires appropriate marking of materials, parts, processes, and appliances as follows:

- (a) Name and address of the manufacturer responsible for compliance,
- (b) Equipment name, or type or model designation,
- (c) Weight to the nearest pound and fraction thereof,
- (d) Serial number and/or date of manufacturer, and
- (e) Applicable Technical Standard Order (TSO) number.

In addition, Subpart A provides that no deviation will be granted from the performance standards established in Subpart B, and that the Administrator may take appropriate action in the event of noncompliance with Part 514.

SUBPART B

§ 514.76 Liferafts (Nonreversible) - TSO-C70--(a) Applicability -
(1) Minimum performance standards. Minimum performance standards are hereby established for liferafts (nonreversible) which are required to be of an approved type to be eligible for use on civil aircraft of the United States. Nonreversible liferaft models manufactured on or after May 1, 1961, shall meet the standards set forth in FAA Standard: "Nonreversible Liferafts"^{1/} dated March 1, 1961.

(b) Marking. The raft shall be permanently marked in accordance with the marking provisions of Subpart A except for the following:

- (1) The serial number of the raft need not be included.
- (2) Include the rated and the overload capacity of the raft.
- (3) Include the type of raft, i.e., Type I or Type II.

(c) Data requirements. (1) One copy each of the following shall be furnished to the Chief, Engineering and Manufacturing Division, Bureau of Flight Standards, Federal Aviation Agency, Washington 25, D. C.:

- (i) Packing instructions.
 - (ii) Operation instructions.
 - (iii) Assembly drawing.
 - (iv) Applicable limitations pertaining to installation of rafts on aircraft. These limitations shall include the minimum and maximum stowage area temperatures and any other limitations which will prevent the raft from performing its intended function and from complying with the minimum performance standards under all reasonably foreseeable emergency conditions. The raft manufacturer shall also provide the purchaser with such limitations.
- (2) The manufacturer shall maintain a current file of complete design data.
- (3) The manufacturer shall maintain a current file of complete data describing the inspection and test procedures applicable to his liferafts. (See paragraph (d) of this section.)

^{1/}Copies may be obtained upon request addressed to: Aeronautical Reference Branch, Correspondence Inquiry Section, MS-126, Federal Aviation Agency, Washington 25, D. C.

(d) Quality control. Liferafts shall be produced under a quality control system, established by the manufacturer, which will assure that each raft is in conformity with the requirements of this section and is in a condition for safe operation. This system shall be described in the data required under paragraph (c)(3) of this section. A representative of the Administrator shall be permitted to make such inspections and production tests at the manufacturer's facility as may be necessary to determine compliance with the requirements of this section.

(e) Effective date. May 1, 1961.

March 1, 1961

FAA STANDARD "NONREVERSIBLE" LIFERAFTS

1.0 Purpose. To establish minimum requirements for approval of nonreversible liferafts to be used on civil aircraft of the United States.

1.1 Scope. This standard covers the following two types of nonreversible liferafts.

Type I - For use in transport aircraft and rotorcraft.

Type II- For use in nontransport aircraft and rotorcraft.

2.0 Materials. The materials used shall be of a quality which experience and/or tests have conclusively demonstrated to be suitable for use in liferafts.

2.1 Non-Metallic Materials. All rubber-coated fabrics and components used in the manufacture of liferafts, shall have been manufactured not more than 18 months prior to the date of delivery of the finished product.

2.1.1 Coated Fabrics, General. All coated fabrics used in the manufacture of liferafts shall possess at least 90% of their original physical properties after these coated fabrics have been subjected to the accelerated aging test specified in Paragraph 6.1 of this standard.

2.1.1.1 Flotation Chamber and Deck. Coated fabrics used for this application shall conform to the following minimum specifications:
(Refer to Paragraph 6.2 of this standard)

Tensile Strength. (Grab Method) Warp 190 lbs./in.
Fill 190 lbs./in.

Tear Strength. (Trapezoidal Method) 13 x 13 lbs./in.

Permeability. Coated fabrics used for flotation chambers shall have a permeability to helium of not more than 10 liters per square meter per 24 hours at 77°F (Max).

Ply & Coat Adhesion. 5 lbs. per inch width at normal room temperature (Approx. 70°F) at 2 in./min.

- 2.1.1.2 Canopy. Coated fabrics used for this purpose shall be waterproof and shall not affect the potability of collected water and shall conform to the following minimum specifications:

Tensile Strength. (Grab Test) Warp 75 lbs./in.
Fill 75 lbs./in.

Tear Strength. (Trapezoidal Test) 4 x 4 lbs./in.

Coat Adhesion. 3.5 lbs. per inch width at normal room temperature at 2 in./min.

- 2.2 Seam Strength and Adhesives. Seams and adhesives used in the manufacture of liferafts shall develop the following minimum strength:

Load Test-Seam Strength. (Max. overlap = 3/4" and Max. width = 2") At 75°F, 350 lbs.
@ 12 in./min. At 140°F, 80 lbs.
@ 12 in./min.

Peel Test-Seam Strength. Seams shall have a peel strength of 5 lbs. per inch width at normal room temperature at 2 in./min. Samples of seams shall retain at least 90% of the above values after having been subjected to an accelerated aging test in accordance with Paragraph 6.1 of this standard.

- 2.2.1 Seam Tape. All seams shall be sealed with bias tape having a minimum width of $1 \frac{1}{4} \pm \frac{1}{16}$ inches. Fabric used for seam tape shall have a minimum breaking strength (Grab Method) of 50 lbs. in both the warp and fill directions.

- 2.3 Metallic Parts. All metallic parts shall be made of corrosion resistant material or shall be suitably protected against corrosion.

- 2.3.1 Protection. All flotation chambers and the raft floor shall be protected in such a manner that non-fabric parts shall not cause chafing or abrasion of the raft fabric in either the packed or inflated condition.

3.0 Design and Construction.

- 3.1 Capacity. The rated and overload capacity of rafts designed to this standard shall be based on not less than the following usable sitting areas on the deck of the raft:

Rated Capacity	Usable Sitting Area Per Person	
	<u>Rated Capacity</u>	<u>Overload Capacity</u>
Type I 10 - 30 persons	3.6 sq. ft. per person	2.4 sq. ft. per person
Type II 1 - 9 persons	3.6 sq. ft. per person	2.4 sq. ft. per person

3.2 Buoyancy.

Type I Raft. The principal buoyancy of the raft shall be provided by two tubes either of which must be capable of supporting the rated number of persons out of water in the event that one tube is deflated. The complete raft, loaded to its rated capacity, shall have a minimum freeboard of at least 12 inches.

Type II Raft. When single tube construction is used to provide the buoyancy, internal bulkheads shall divide the flotation tube into at least two separate chambers. The bulkheads shall be installed in such a manner so that the volume of the chambers formed, shall be approximately equal. The complete raft loaded to its rated capacity shall have a minimum freeboard of at least 6 inches.

Note. An average weight of 170 lbs. per person shall be used in all applicable calculations and tests specified herein.

- 3.3 Inflation. The entire primary flotation tube(s) shall be inflated to a pressure of not less than 1 1/2 p.s.i. and not more than 3 p.s.i. at a corrected temperature of 70°F and at a corrected standard atmospheric pressure. The inflation system shall be arranged so that failure of one tube chamber or manifold will not result in the loss of gas from the other tube or chamber(s). All tubes which provide primary flotation shall be fully inflated from the main inflation system. The inflation equipment shall be located outside of the raft so as not to interfere with raft boarding operations.

When an air aspirator system is used, the aspirator shall have a quick opening one-way valve for inflation and incorporate a positive gas seal assisted by back pressure when closed. Means shall be provided to preclude ingestion of objects which may prevent the positive seating of the gas seal.

Type I Raft. One pressure vessel shall be provided for the inflation of each primary flotation tube.

Type II Raft. A single pressure vessel for inflation may be used.

Note. All pressure vessels used in liferafts shall meet I.C.C. requirements.

3.4 Canopy. (Applicable to both Type I and Type II Rafts)

The canopy shall be capable of protecting the occupants from adverse conditions which are to be expected under actual sea conditions. The erected canopy shall withstand 40-mile winds and gusts up to 60 m.p.h. in open water. Closable outlet(s) shall be provided to permit controlled trapping of rainwater.

Type I Raft. The raft shall be equipped with an integral self-erecting canopy which shall become automatically erected upon initial inflation of the raft. The canopy shall provide adequate headroom and shall have provisions for openings 180° apart. Means shall be provided to make the openings completely weather tight.

Type II Raft. A suitable protective canopy shall be provided. If of the manually erected type, the canopy shall permit ease of installation and it shall be demonstrated that it can be satisfactorily erected when using only the items supplied in raft kit.

3.5 Water Pockets. Water pockets to offer capsizing resistance and to improve stability shall be provided on the underside of the raft floor on Type I rafts.

3.6 Boarding Aids. Type I rafts shall be provided with a boarding aid at each open end of the raft. One boarding aid is sufficient for a Type II raft. Boarding aids shall permit unassisted entry from the water into the unoccupied raft and shall not at any time impair the rigidity of the raft nor its inflation characteristics. (Ref. Paragraph

6.5.5.1 of this standard.) Boarding handles and/or stirrups used in conjunction with the boarding aids shall be designed to withstand a pull of 500 lbs.

3.7 Righting Aid(s). Means shall be provided as required to right the raft if it inflates in an inverted position. The means provided for righting shall be designed so that they may be utilized by one person in the water. (Ref. Paragraph 6.5.5.2 of this standard.)

3.8 Lifeline. A non-rotting lifeline such as nylon, polyethylene, etc., of contrasting color of at least 3/8 inch dia. shall encircle the raft on the outside periphery so that it can be easily grasped. The lifeline and attaching raft loops shall be capable of withstanding a minimum load of 500 lbs. This line shall be incapable of contributing to the strangulation of the raft during inflation.

3.9 Manual Inflation Valves. Manual inflation valves with openings adequate for the size and capacity of the hand pump (Ref. Paragraph 4.4 and 4.4.1 of this standard) shall be located so as to permit hand pump inflation of all tubes and chambers.

3.10 Color. The color of the raft's surfaces which are visible from the air shall be of an International Orange-Yellow or of an equivalent high visibility color.

4.0 Accessory Equipment.

Note. All lines shall be suitably stowed and secured to prevent entanglement during launching of the raft.

4.1 Raft Mooring Line. One non-rotting line such as nylon, polyethylene, etc., having a minimum length of 20 ft. shall be provided with each packaged liferaft. One end of the line shall be suitably attached to the raft and the rest of the line shall be held flaked to the carrying case. (Ref. Section 4.7 of this standard.) The line shall have a minimum strength of at least 500 lbs. for Type I rafts and 300 lbs. for Type II rafts. The line shall be designed to release the raft in case the airplane becomes totally submerged.

4.2 Sea Anchor. Sea anchors having diameters of at least 20 inches for Type I rafts and 12 inches for Type II rafts shall be provided. A point of attachment having a strength of at least 500 lbs. shall be provided on the main flotation chamber for the attachment of the sea anchor.

- 4.3 Heaving-Trailing Line. At least one floating heaving-trailing line not less than 75 ft. (for Type I rafts) and 35 ft. (for Type II rafts) in length and at least 250 lbs. strength shall be located on the main flotation tube near the sea anchor attachment.
- 4.4 Inflation Pump. A manual hand inflation pump shall be provided. It shall be suitably attached to the raft to prevent loss, either when stowed or in use. Pump stowage shall permit compact raft packing and easy access when the raft is afloat. The pump outlet shall fit the manual valves which are referenced in Paragraph 3.9 of this standard.
- 4.4.1 Pump Displacement. The pump shall have a minimum displacement of at least 32 cubic inches per full stroke.
- 4.5 Accessory Case Tie-Downs. Provisions shall be made for tie-downs to hold the accessory case. Each tie-down shall be capable of withstanding a pull of 250 lbs.
- 4.6 Carrying Case. A carrying case which is flame resistant in accordance with Paragraph 7.0 of this standard shall be provided for each liferaft. The closing end(s) of the case shall have at least a four inch dust flap extended into the case. Conventional zippers shall not be employed for closure.
- 4.7 Raft Launching Equipment. A parachute ripcord grip, similar to current AN types, shall form the primary inflation control. The ripcord grip shall have a minimum strength of at least 500 lbs. for Type I rafts and 300 lbs. for Type II rafts. The ripcord grip shall be provided with some means to enable the attachment of the grip to the airplane.

The position of the ripcord grip shall be standardized. When facing the release end of the carrying case, the center line of the retaining pocket shall lie at 45 degrees in the right upper quadrant of the end section. The outermost extremity of the ripcord grip shall not extend beyond the outer margin of the carrying case. The ripcord grip shall serve both to retain the raft by means of a line and to actuate the gas releases. The length of the installed gas release cables shall be identical and shall

not exceed thirty (30) inches. The tension required to withdraw the mooring line and to actuate the gas release mechanism(s) shall be between 20 and 30 lbs. The strength of the gas release cables, their fittings and their attachments shall be no less than 100 lbs.

- 4.8 Sampling Test Strips. Two 6" x 10" sampling test strips of the same fabric used in raft tube construction shall be attached to the raft. These strips shall be suitably identified and shall be permanently attached at the ends only so that a test specimen can be removed without damage to the raft. The edges of the test strips shall be sealed when initially installed and after each specimen is removed.

- 4.9 Knife. A hook type knife, secured by means of a retaining line shall be provided with each raft. The knife shall be sheathed in a knife pocket which shall be cemented to the raft adjacent to the point of mooring line attachment.

5.0 Placards.

- 5.1 Placarding Instructions. Suitable placarding in contrasting colors in waterproof paint which is not detrimental to the fabric, shall denote use and location of the inflation system, raft equipment, boarding aids and righting aids. The letters used for such placarding shall be at least 2" high. The placarding shall take into account persons boarding or righting the raft from the water.

6.0 Tests.

- 6.1 Accelerated Age Test for Coated Fabrics. Samples of coated cloth used in the raft shall be suspended in an air circulating oven and exposed to a temperature of $158 \pm 4^{\circ}\text{F}$ for a period of 168 hours. After aging, the samples shall be allowed to cool to room temperature for not less than 16 nor more than 96 hours before determining their physical properties in accordance with Paragraph 2.1.1 of this standard.
- 6.2 Tests for Strength of Coated Fabrics. Coated fabrics shall be tested when in moisture equilibrium in a standard atmosphere having a relative humidity of 65% at 70°F (21°C). A relative humidity tolerance of $\pm 2\%$ and a temperature tolerance of $\pm 2^{\circ}\text{F}$ (1.1°C) are permitted.

Note. It shall be considered that moisture equilibrium is reached when, after free exposure to air in motion, the change in weight of the fabric in successive weighings made at intervals of one hour is no greater than .25%. Certain coatings may greatly retard moisture penetration into the fabric and; therefore, fabrics coated on both sides may require 24 hours or more to reach equilibrium.

6.2.1 Testing Machine. A machine shall be used wherein the specimen is held between two clamps strained by a uniform movement of the pulling clamp. The design of each clamp shall be such that one gripping surface or jaw shall be an integral part of the rigid frame of the clamp while the other shall be on a part hinged or swiveled to the movable member of the clamp. The gripping surfaces of the clamp shall be metallic and shall be sufficiently flat and parallel to prevent slipping of the specimen during the test. All edges which might cause a cutting action shall be rounded to a radius of not over $1/64$ ". The indicator which is used to determine the applied tension shall remain at the point of maximum load after rupture of the specimen occurs. The error of the machine at any reading within its loading range shall not exceed 2% up to and including a 50 lb. load or 1% over a 50 lb. load. The machine shall be of such capacity that the maximum load required to break the specimen is not greater than 85% of the machine's rated capacity.

6.2.2 Grab Method. The fabric test specimens shall have dimensions of at least 4 x 6 inches. The long dimension shall be parallel to the warp for warp tests and parallel to the fill for fill tests. The fabric test specimens shall be taken no nearer the selvage than $1/10$ the width of the coated fabric and no two specimens to be tested in one direction shall be woven from the same thread or yarn. One gripping surface of each clamp shall be one inch by one inch. The other gripping surfaces shall measure one inch by $1\frac{1}{2}$ or more inches with the longer dimension perpendicular to the direction of application of the load. The specimen shall be placed symmetrically in the clamps of the machine with the long dimension parallel and short dimension perpendicular to the direction of application of the load. The distance between clamps shall be at least 3 inches at the start

of the test and the force shall be applied to the specimen at such a rate that the pulling clamp will travel at a uniform speed of $12 \pm .5$ inches/min. The recorded breaking strength (tensile strength) shall be the average of the results obtained from at least 5 specimens tested in each of the warp and fill directions.

6.2.3 Trapezoidal Method. The test specimens shall be 3 x 6 inches. The longer dimension shall be parallel to the lengthwise direction of the coated fabric to test for longitudinal tearing strength. The longer dimension shall be parallel to the crosswise direction of the coated fabric to test for transverse tearing strength. An isosceles trapezoid having an altitude of three inches and bases of one and four inches respectively shall be marked on each specimen. A cut $1/4$ to $3/8$ of an inch in length shall be made in the center of the one inch edge and perpendicular to it. The gripping surfaces of each clamp shall be one inch by three inches with the longer dimension perpendicular to the direction of application of the load. The specimen shall be clamped in the machine along the nonparallel sides of the trapezoid so that the cut is halfway between the clamps. The distance between clamps at the start of the test shall be one inch and the force shall be applied to the specimen at such a rate that the pulling clamp will travel at a uniform speed of $12 \pm .5$ inches per minute. The average of the results of at least 5 individual tests in each direction shall be recorded as the longitudinal and transverse tearing strengths respectively.

6.3 Flotation Chambers and Boarding Aids. Each main flotation chamber, inflatable boarding aid if provided, and inflatable canopy support shall be inflated with oil free air to a pressure of 2.00 p.s.i.g. At the end of one hour, the pressure shall be checked and adjusted to 2.00 p.s.i.g., if necessary. At the end of 24 hours, the pressure, adjusted for ambient temperature, shall not be less than 1.50 p.s.i.g. in order for the raft to be acceptable.

6.3.1 Overpressure. Each raft chamber or compartment, excluding inflatable floor chambers, shall be subjected to an inflation pressure test of 4.00 p.s.i.g. for not less than 5, nor more than 10, minutes for the raft to be acceptable.

6.4 Overpressure Proof Test. One raft shall be selected at random from each lot of 25 or fraction thereof being manufactured and subjected to an overpressure proof test of 6.00 p.s.i.g. for not less than 5 nor more than 10 minutes. Rafts so tested shall be identified to the customer prior to sale.

6.5 Functional Tests for New Model Rafts. A new model raft shall pass the functional tests stated below. A previously approved model of a raft modified in such a manner that its performance characteristics, such as buoyancy, inflation, seaworthiness and boarding, are changed, shall be subjected to such of the following tests as are necessary to assure that there is no adverse effect on performance as a result of the modification.

A new model raft is one which:

- (a) Has never been previously accepted as conforming to this specification.
- (b) Was a previously approved model but which has been subsequently redesigned to such an extent that all or only a portion of the performance tests must be conducted in order to substantiate the redesign.

6.5.1 Raft Static Inflation. The complete raft package shall be inflated by means of the installed inflation equipment at room temperature (70°F) at sea level. At the end of one hour, the raft shall meet the design requirements of this specification for both pressure and volume. This same test shall be performed on a raft selected at random from each lot of 25 or fraction thereof being manufactured.

6.5.2 Carrying Case. It shall be demonstrated for at least 10 times that the carrying case will open satisfactorily and cause no delay in the inflation and deployment of the raft.

6.5.3 Gas Cylinder Releases. It shall be demonstrated that pulling the ripcord grip from any position will actuate the primary gas cylinder release(s).

6.5.4 Raft Drop Test. A complete raft package shall be dropped or thrown from a height of 5 feet onto a hard surface floor to demonstrate that no failure or malfunction in the inflation system will occur and that the raft will inflate satisfactorily after such a drop.

6.5.5 Water Tests. It shall be demonstrated in water that the liferaft, folded and packed in accordance with the manufacturer's instructions, will deploy satisfactorily and inflate in a normal manner when the release mechanism is actuated. If the raft is of the aspirator inflated type, the complete raft package when thrown into the water in any attitude shall right itself in such a manner that during inflation the amount of water ingestion will be inconsequential.

6.5.5.1 Boarding Test. It shall be demonstrated in water that the boarding aids are adequate for the purpose intended and that it is possible for a middle-aged person wearing an inflated life jacket to board the raft unassisted.

6.5.5.2 Righting Test. It shall be demonstrated that the liferaft can be righted by one person in the water when the inflated raft is in the inverted position.

6.5.6 Temperature Exposure and Inflation. The manufacturer shall determine the minimum temperature at which the complete raft assembly with its inflation bottles, will be "rounded out" (i.e., attain its design shape and approximate dimensions) so that it will be able to receive the first occupant within one minute after the start of inflation. Thereafter, the rate of inflation shall progress in such a manner as to ensure a serviceable and rigid raft for boarding by the remainder of the occupants. Similarly, a maximum environmental temperature to which the raft assembly may be exposed and still remain in a seaworthy condition upon inflation, shall be determined.

6.5.6.1 Test Procedure. The packed raft assembly with its inflation bottles installed shall be exposed to each of the above temperatures for not less than 24 hours

and shall be inflated within 5 minutes after removal from such temperatures. The raft shall be allowed to return to a temperature of approximately 70° F. before being deflated, repacked, and subjected to the second exposure.

After the above tests have been completed, the raft shall be able to pass tests called for under Paragraphs 6.3, 6.3.1, and 6.4 of this specification.

Note. The temperature limitations as determined above shall be submitted to the FAA and raft purchaser in accordance with Paragraph 514.76(c)(1) of this standard.

7.0 Test for Flame Resistant Materials for Liferaft Carrying Case.

Test Specimens. Three specimens, approximately 4 inches wide and 14 inches long, shall be tested. Each specimen shall be clamped in a metal frame so that the two long edges and one end are held securely. The frame shall be made of rectangular sections approximately one inch in width and 1/4 inch in thickness with overall dimensions such that the exposed area of the specimen is at least 2 inches wide and 13 inches long, with the free end at least 1/2 inch from the end of frame for ignition purposes. In the case of fabrics, the specimens shall be cut so that the 14 inch length is parallel to the direction of the warp. It has been found that the pattern of some cloth may cause the cloth to be more hazardous in one direction than in the other, in which case the 14 inch dimension of the specimen shall be parallel to the more hazardous direction.

A minimum of 10 inches of the specimen shall be used for timing purposes, and approximately 1 1/2 inches must burn before the burning front reaches the timing zone. The timing should be stopped at least one inch before the burning front reaches the metal frame across the specimen, since dissipation of the heat by the metal frame may appreciably affect the burning progress at the end.

Test Procedure. The specimen shall be supported horizontally and tested in a draft-free room or under a draft-free hood. The surface that will be exposed shall face down for the test. The specimens shall be ignited by a Bunsen or a Tirrell burner. To be acceptable, the average burn rate of the three specimens must not exceed 4 inches per minute. In addition, if the specimens do not support combustion after the ignition flame is applied for 15 seconds, or if the flame extinguishes itself and subsequent burning without a flame does not extend into the undamaged areas, the material is also acceptable. (Federal Specification CCC T191-b, Method 5906 may be used as an alternate method for testing materials of this type, but the material shall not exceed the 4 inches per minute burn rate.)